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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/045,814	01/15/2002	Joseph M. Fukumoto	PD-01W023	3118

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PATENT DOCKET ADMINISTRATION
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EXAMINER
LEE, JOHN D

ART UNIT	PAPER NUMBER
2874	

DATE MAILED: 01/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/045,814	FUKUMOTO, JOSEPH M.	
	Examin r	Art Unit	
	John D. Lee	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *27* is/are allowed.

6)☒ Claim(s) *1-6,11-19,22-26 and 28-30* is/are rejected.

7)☒ Claim(s) *7-10,20 and 21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *0102,1003*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

The three (3) sheets of drawing filed with this application on January 15, 2002, are acceptable.

The specification is objected to because, on page 1, the Serial Number and filing date of the referenced copending U.S. Patent Application must be furnished. Also on page 1 of the specification, the reference to U.S. Patent Application Serial Number 09/478,229 should be updated to reflect that this is now U.S. Patent Number 6,344,920. Applicant's cooperation is requested in correcting any other informalities that may be discovered during review of the specification.

The Abstract of the Disclosure is objected to because it is too long. The Examiner has counted 226 words, but the current Rules of Practice limit the Abstract to a maximum of 150 words. Correction is required. See MPEP § 608.01(b).

The following is a quotation of the first paragraph of 35 U.S.C. § 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 25, 29, and 30 are rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 25 recites an invention wherein the fourth wavelength (the final converted output wavelength) is in the range of 4.0 to 4.8 microns. Such an invention, however, is not taught in the specification. All embodiments therein are directed to inventions having a fourth wavelength (the final converted output wavelength) in the range of 8 to 12 microns. The only recitation of the wavelength range of 4.0 to 4.8 microns is found in Table I, but this range is for

the signal wavelength, not the outputted fourth wavelength. Claims 29 and 30 recite inventions wherein the crystal producing a primary emission is ***potassium titanyl arsenate***. It is noted, however, that the present application actually teaches away from the use of this material, teaching that the crystal should rather be rubidium titanyl arsenate. There is thus no enabling support for the use of potassium titanyl arsenate. These claims will not be further examined with respect to prior art.

The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 13, 14, 16, and 17 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In each of these four claims, there is no antecedent support for the use of the terms "said fifth wavelength" and "said sixth wavelength", thus rendering the claims indefinite. The dependencies of these claims should be revisited, inasmuch as the "fifth wavelength" was first recited in claim 7 and the "sixth wavelength" was first recited in claim 9 (with no prior claim reciting both a fifth wavelength and a sixth wavelength). The claims as presented therefore cannot be further examined with respect to prior art.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4, 5, 11, 12, 15, 18, 22-24, 26, and 28 are rejected under 35 U.S.C. § 102(b) as being anticipated by Chandra et al (Applied Physics Letters article submitted by applicant in

the Information Disclosure Statement on October 14, 2003). Chandra et al discloses a tandem optical parametric oscillator arrangement for producing output optical radiation in the 8-12 micron wavelength range. The Chandra et al arrangement comprises first means (a KTP OPO) for shifting optical radiation received at 1.06 microns to a second wavelength of 1.57 microns, and outputting the shifted radiation to a third means (a $AgGaSe_2$ OPO) which then parametrically shifts the radiation to output radiation of a fourth wavelength in the 8-12 micron wavelength range. There is also a second means (first and second mirrors) disposed in functional alignment with the first means (KTP OPO) for enhancing the parametric conversion process therein. Although not explained in detail in the Chandra et al reference, the KTP OPO operates in typical three-wave OPO fashion, with the output thereof resulting from a secondary process induced by a primary process between two of the three waves within the parametric oscillator cavity. The mirrors are designed with the appropriate reflectivities to enhance, contain, and transmit the appropriate optical waves. Note that KTP is crystalline.

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3, 6, and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Chandra et al (Applied Physics Letters article submitted by applicant in the Information Disclosure Statement on October 14, 2003). As noted in the rejection above, Chandra et al does not go into any detail regarding the parametric process within the KTP optical parametric oscillator. The mirror reflectivities for each of the pump, signal, and idler waves are therefore

not 100% clear. The person of ordinary skill in the art, however, would have known to make the cavity mirrors highly reflective for oscillation of the wavelength emitted by the primary process which, in turn, generates the outputted second wavelength of 1.57 microns. This would have been an obvious consideration. Similarly, the precise reflectivity of the Gradient R mirror of Chandra et al (see FIG. 1) for the 1.57 microns wavelength is not given, but the person of ordinary skill in the art would obviously have understood it to be somewhere in the range of fifty percent. Finally, the cut of the KTP crystal in Chandra et al is not clear, but the use of an X-cut crystal would have been obvious since phase matching is critical therein.

Claim 27 is allowed. Chandra et al (the closest prior art of record) does not disclose or suggest the use of rubidium titanyl arsenate (RTA) as the first OPO crystal material.

Claims 7-10, 20, and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. There is no indication that fifth and/or sixth wavelengths are additionally generated by the parametric process within the Chandra et al KTP optical parametric oscillator. Also, Chandra et al (the closest prior art of record) does not disclose or suggest the use of rubidium titanyl arsenate (RTA) as the first OPO crystal material.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The two (2) cited U.S. Patents to Fukumoto correspond to the two (2) PCT Publications cited by the International Examiner (see the Information Disclosure Statement filed on October 14, 2003). Other tandem arrangements for optical nonlinear crystals, including tandem optical parametric oscillators, can be seen in the cited U.S. Patents to Komine and Moulton, and in the cited IEEE J.Q.E. publication by Moore et al.

All of the prior art documents submitted by applicant in the Information Disclosure Statements filed on January 15, 2002, and October 14, 2003, have been considered and made of record. Note the attached initialed copy of forms PTO-1449.

Any inquiry concerning the merits of this communication should be directed to Examiner John D. Lee at telephone number (571) 272-2351. The Examiner's normal work schedule is Tuesday through Friday, 6:30 AM to 5:00 PM. Any inquiry of a general or clerical nature (i.e. a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at telephone number (703) 308-0956, to the technical support staff supervisor (Team 2) at telephone number (703) 308-3072, or to the Technology Center 2800 Customer Service Office at telephone number (703) 306-3329.

John D. Lee
Primary Patent Examiner
Group Art Unit 2874